REMARKS

Claims 1-2 are presently pending in the application.

The Title of the Invention has been amended to "Low Viscosity Lubricating Oil Composition for Transmission of Automobiles," which Applicants submit is indicative of the present invention. Several minor typographical and grammatical errors in the specification have been corrected. Finally, claims 1 and 2 have been amended to positively recite that the kinematic viscosity is measured at 100°C, which is supported in the specification at least at page 5, lines 8-11, and to delete "or less" in claim 2, which was a typographical error. No new matter has been added by these amendments, and entry is respectfully requested. Further, since these amendments overcome the Examiner's objections to the specification and to the claims, reconsideration and withdrawal of the objections are respectfully requested.

In the Office Action, the Examiner has rejected claims 1 and 2 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,482,778 of Tersigni et al. ("Tersigni") in view of U.S. Patent Application Publication No. 2001/0044389 of Komiya et al. ("Komiya"). The Examiner argues that Tersigni teaches a transmission fluid composition comprised of a phosphorus-containing additive and a base oil, such as a paraffinic or naphthenic mineral oil, with a kinematic viscosity of 3 to 8 centistokes at 100°C, which the Examiner contends overlaps the claimed viscosity range. The Examiner argues that Tersigni further teaches the addition of a viscosity index improver so that the kinematic viscosity of the composition is increased to at least 5.0 cSt at 100°C, which the Examiner argues overlaps the claimed viscosity. The phosphorus content is allegedly also 0.02 to 0.08 percent by mass. Finally, the Examiner argues that Tersigni teaches that antioxidants, including sulfurized phenolic antioxidants, are typically added to the composition in the amount of 0 to 1 mass percent. The Examiner acknowledges that Tersigni is silent as to the %Cp of the disclosed mineral oil.

However, the Examiner argues that Komiya discloses a lubricating composition for transmissions which contains mineral oil, such as paraffinic or naphthenic mineral oil with a kinematic viscosity of 1 to 4 mm^2/s. The Examiner argues that such a viscosity overlaps the claimed viscosity range. Additionally, the %Cp of the oil is allegedly 70 or higher as defined by ASTM D 3238. The Examiner takes the position that the transmission oils disclosed by Tersigni

and Komiya both contain similar mineral oils, paraffinic and naphthenic oils at the same viscosity, and would therefore display the same characteristics. Further, referring to Table 1 and paragraph [0013] of Komiya, the Examiner argues that Komiya specifically uses mineral oil with a % Cp from 75 to 81 since such a base oil displays excellent low temperature fluidity. Therefore, the Examiner concludes that it would have been obvious to use a base mineral oil having a % Cp of 75-81 in the transmission oil of Tersigni because Komiya teaches that enhanced low temperature fluidity would result. Applicants respectfully traverse this rejection as follows.

The purpose of the presently claimed invention is to provide a low viscosity transmission lubricating oil composition which can enhance fuel efficiency and improve the durability of gears and the shifting properties of wet clutches, including long-lasting shifting properties. As described in the specification, it is known that while lowering the viscosity of a transmission lubrication oil composition is effective in improving the fuel efficiency, traditional low viscosity oils will deteriorate the durabilities of gears, which affects the transmission ratios, and also deteriorate the durability of the shifting properties of wet clutches. As a result, the extreme pressure properties of the automatic transmission oil will be reduced and thus cause seizure of the gears, resulting in malfunctions of the automatic transmission. Similarly, because of the reduced viscosity of these conventional oils, the durability of the shifting properties of the clutches becomes poor since the dynamic friction coefficient needed to fully couple the clutches is not attained. Therefore, there remained a need for a low viscosity transmission oil which could provide sufficient durability to gears and to the shifting properties of wet clutches.

Accordingly, the presently claimed composition was developed to meet these objectives. The presently claimed composition has a low viscosity of 5.0 to 6.0 mm^2/s at 100° C and a sulfur content of not more than 0.15 percent by mass of the composition. This composition is obtained by adding appropriate amounts of (B) a phosphorus compound and (C) a viscosity index improver to (A) a specific mineral lubricating base oil having a kinematic viscosity of 2.3 to 3.4 mm^2/s at 100°C and a %Cp of not less than 70. The resulting composition is highly fuel efficient and capable of improving the durability of gears and the shifting properties of wet clutches.

The advantageous effects achieved by the presently claimed composition may be seen by comparing Examples 1 to 6 with Comparative Examples 1 to 5, shown in Tables 1 and 2 of the

present application. It can be seen that the oil samples of Examples 1 to 6, according to the present invention, exhibited a small reduction in the dynamic friction coefficient in the SAE test and high extreme pressure properties in the Last Non-Seizure Load test. In contrast, the oil samples of Comparative Example 1 (containing a base oil with a %Cp of less than 70) and Comparative Example 2 (containing a base oil with a %Cp of less than 70 and a sulfur content more than 0.15) exhibited a larger reduction in dynamic friction coefficient. Further, the oil samples of Comparative Example 3 (sulfur content greater than 0.15) and Comparative Example 4 (phosphorus content less than 0.025) were not satisfactory in either extreme pressure properties or dynamic friction coefficient. Finally, the oil sample of Comparative Example 5, having a kinematic viscosity of less than 2.3 mm^2/s at 100°C, a % Cp of less than 70, and a sulfur content of more than 0.15, was not satisfactory in either extreme pressure properties or dynamic friction coefficient. Accordingly, the claimed %Cp of the base oil and sulfur content of the transmission oil are critical for providing the properties observed by the presently claimed invention.

Tersigni discloses a transmission fluid composition comprising a base oil and a phosphorus-containing additive which is designed to provide high steel-to-steel friction properties in continuously variable transmissions (CVT) for realizing high torque transmission between a steel belt and pulleys. Tersigni teaches that the preferred composition has a kinematic viscosity of at least 6.8 cSt at 100°C, achieved using viscosity index improvers, which corresponds to a conventional high viscosity composition. Tersigni does not teach or suggest the advantages of low viscosity compositions at improving fuel efficiency or recognize the disadvantages of such compositions on the durability of gears and the shifting properties of wet clutches.

As acknowledged by the Examiner, Tersigni is completely silent as to the %Cp of the mineral oil and does not recognize the effects on dynamic friction and extreme pressure properties of the resulting transmission oil which are achieved by including a mineral oil with a specific % Cp. Therefore, there would have been no motivation to modify the composition of Tersigni to improve the durability of gears and the shifting properties of wet clutches (attributes which are not taught by Tersigni) by including a mineral oil with the % Cp taught by Komiya.

The Examiner argues that since both Tersigni and Komiya teach transmission oils with similar mineral oils at the same viscosity, these compositions would display the same

characteristics. The Examiner concludes that it would have been obvious to use the mineral oil of Komiya in the Tersigni composition to achieve enhanced low temperature fluidity. However, if, as asserted by the Examiner, the Komiya and Tersigni compositions had the same characteristics, there would have been no motivation to alter the Tersigni composition to include the mineral oil of Komiya to enhance low temperature fluidity. In fact, the mineral oils in the compositions of Komiya and Tersigni are quite different in kinematic viscosity. Tersigni teaches at page 12, lines 16-18 that the base oil has a kinematic viscosity of 1 to 10 mm^2/s at 100°C, preferably 3 to 8 mm^2/s. In contrast, Komiya teaches in paragraph [0014] that the mineral oil has a kinematic viscosity of 1 to 10 mm^2/s, preferably 1 to 4 mm^2/s. Therefore, the mineral oils which are preferred by Komiya and Tersigni are different, and there would have been no motivation to replace one with the other.

Even if the proposed combination of Komiya and Tersigni were proper, it would not teach or suggest all of the claimed elements. First, the composition would not be a low viscosity composition having a kinematic viscosity of 5 to 6 mm^2/c at 100°C, since the Tersigni composition preferably has a kinematic viscosity of at least 6.8 mm^2/s and the Komiya composition has a kinematic viscosity of 7.3 mm^2/s (paragraph [0103]). Further, neither references teaches or suggests limiting the sulfur content to 0.15 percent by mass or less.

Finally, such a proposed combination would not provide the results exhibited by the presently claimed composition. That is, Tersigni is completely silent as to the %Cp of the mineral oil, and Komiya does not teach or suggest that the use of a low viscosity transmission oil containing a mineral oil with a %Cp of greater than 70 would improve the durabilities of both gears and wet clutches. Also, neither reference teaches or suggests limiting the sulfur content, nor the positive results which may be achieved by such a limitation. Accordingly, the criticality of such properties of the composition and their effects on the properties of the resulting transmission oil would not have been expected. Such unexpected properties would overcome any case of *prima facie* obviousness which were to be established.

For all of these reasons, reconsideration and withdrawal of the § 103(a) rejection are respectfully requested.

In view of the preceding Amendment and Remarks, it is respectfully submitted that the pending claims are patentably distinct from the prior art of record and in condition for allowance. A Notice of Allowance is respectfully requested.

Respectfully submitted,

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